



a.

As part of the study to evaluate whether students whose parents attended higher level of education turned up with higher population mean math score on SAT than mean math score of students appeared on SAT, whose parents did not pursue higher level education, two sample of SAT scores of students, whose parents had bachelor degree and the other had only High school degree were considered. The population means for two samples are as follows:

$\mu_1$  = the mean SAT math score of students whose parents had bachelor degree.

$\mu_2$  = the mean SAT math score of students whose parents had high school degree.

The tentative assumption corresponding to null hypothesis was that there existed less than or equal to difference between mean SAT scores of both the samples. If sample evidence leads to rejection of null hypothesis then it could be concluded that students whose parents had bachelor degree had higher mean math SAT score compared to students whose parents had only high school degree. The hypothesis when represented in symbols are as follows:

$$H_0 : \mu_1 - \mu_2 \leq 0$$

$$H_a : \mu_1 - \mu_2 > 0$$



Hence, the required answer is

$$\begin{array}{l} H_0 : \mu_1 - \mu_2 \leq 0 \\ H_a : \mu_1 - \mu_2 > 0 \end{array}$$

b.

The point estimate of difference between the two population means is obtained as follows:

$$\begin{aligned}(\bar{x}_1 - \bar{x}_2) &= 525 - 487 \\ &= 38\end{aligned}$$

Where,  $\bar{x}_1$  is the mean math SAT scores of students whose parents had bachelor degree and  $\bar{x}_2$  is the mean math SAT score of students whose parents had only high school degree.

The calculations for obtaining the average of each of the sample were demonstrated in the following part.

Hence, the point estimate of the difference between the two population mean is 38

c.

To compute the  $p$  value for the hypothesis test, do as follows:

Step1. Click the Data tab on the Ribbon.

Step2. In the Analysis group, click Data Analysis.

Step3. Choose t-test-Sample Assuming Unequal Variances from the list of Analysis Tools.

Step4. When the corresponding dialog box appears, enter the followings:

Enter A1:A17 in the Variable 1 Range box.

Enter B1:B13 in the Variable 2 Range box.

Enter 0 in the Hypothesized Mean Difference box  
Select Labels.

Enter 0.05 in the Alpha box.

Select Output Range and enter D1 in the box.

Click OK.

The screen shot is as follows:

| D                                             | E              | F                  |
|-----------------------------------------------|----------------|--------------------|
| t-Test: Two-Sample Assuming Unequal Variances |                |                    |
|                                               |                |                    |
|                                               | <i>College</i> | <i>High School</i> |
| Mean                                          | 525            | 487                |
| Variance                                      | 3530.8         | 2677.818182        |
| Observations                                  | 16             | 12                 |
| Hypothesized Mean E                           | 0              |                    |
| df                                            | 25             |                    |
| t Stat                                        | 1.803752618    |                    |
| P(T<=t) one-tail                              | 0.04166737     |                    |
| t Critical one-tail                           | 1.708140745    |                    |
| P(T<=t) two-tail                              | 0.08333474     |                    |
| t Critical two-tail                           | 2.059538536    |                    |

From the output, the  $p$ -value for the hypothesis test is

0.0417.



d.

The given level of significance is  $\alpha = 0.05$  and the  $p$ -value obtained is 0.0417.

The  $p$ -value being less than the significance level (0.05), the researcher could reject null hypothesis and it could be concluded that mean math SAT score of students whose parents had bachelor degrees was higher than mean math SAT score of students whose parents had only high school degrees.